In the Claims:

Claim 1 (canceled)

2.   (currently amended) The method in accordance with claim 22 [[1]], wherein said further data is transmitted from said position measuring system to said processing unit.

3.   (currently amended) The method in accordance with claim 22 [[1]], further comprising transmitting a position request command for requesting said up-to-date position data; and

        always transmitting immediately following said position request command, further data, whose processing is not time-critical.

4.   (original) The method in accordance with claim 3, wherein said further data is transmitted from said processing unit to said position measuring system.

5.   (currently amended) The method in accordance with claim 22 [[1]], further comprising transmitting said up-to-date position data and said position request command in the form of digital data words of a predetermined word length, or as data packets comprising digital data words.

6.   (original) The method in accordance with claim 3, further comprising transmitting said up-to-date position data and said position request command in the form of digital data words

2

of a predetermined word length, or as data packets comprising digital data words.

7.   (currently amended) The method in accordance with claim 22 [[1]], further comprising transmitting additional non-time-critical data in the form of digital data words of a predetermined word length, or as data packets comprising digital data words.

8.   (original) The method in accordance with claim 7, wherein said additional non-time-critical data comprises additional data and additional data commands.

9.   (original) The method in accordance with claim 3, further comprising transmitting additional non-time-critical data in the form of digital data words of a predetermined word length, or as data packets comprising digital data words.

10.   (original) The method in accordance with claim 9, wherein said additional non-time-critical data comprises additional data and additional data commands.

11.   (original) The method in accordance with claim 22 [[1]], further comprising:

        having a position request signal arrive in said processing unit during said transmission of non-time-critical data;

        interrupting said transmission of said non-time-critical data;

        immediately transmitting a position data request command to said position measuring system in the place of said non-time-critical data, whereupon said up-to-date position

data are immediately transmitted from said position measuring system to said processing unit.

12.   (original) The method in accordance with claim 3, further comprising:

having a position request signal arrive in said processing unit during said transmission of non-time-critical data;

interrupting said transmission of said non-time-critical data;

immediately transmitting a position data request command to said position measuring system in the place of said non-time-critical data, whereupon said up-to-date position data are immediately transmitted from said position measuring system to said processing unit.

13.   (original) The method in accordance with claim 11, wherein said interrupting said transmission of said non-time-critical data is completed at a later time after said up-to-date position data has been completely transmitted by said position measuring system to said processing unit.

14.   (currently amended) The method in accordance with claim 22 [[1]], further comprising interrupting said transmission of said non-time-critical data when a position request command arrives in said position measuring system during said transmission of non-time-critical data; and

transmitting said up-to-date position data to said position measuring system in place of said non-time-critical data.

4

15.   (original) The method in accordance with claim 3, further comprising interrupting said transmission of said non-time-critical data when a position request command arrives in said position measuring system during said transmission of non-time-critical data; and

transmitting said up-to-date position data to said position measuring system in place of said non-time-critical data.

16.   (original) The method in accordance with claim 3, wherein all data transmitted between said position measuring system and said processing unit are transmitted over a common data channel.

17.   (original) The method in accordance with claim 3, wherein data transmitted from said position measuring system to said processing unit are transmitted via a first data channel, and said data transmitted from said processing unit to said position measuring system are transmitted via a second data channel.

18.   (original) The method in accordance with claim 3, further comprising storing said non-time-critical data.

19.   (original) The method in accordance with claim 18, wherein said non-time-critical data is transmitted by said processing unit to said position measuring system and said storing comprises storing said transmitted non-time-critical data in a memory unit of said position measuring system.

20.   (original) The method in accordance with claim 19, further comprising storing non-time-critical data transmitted by said position measuring system in a second memory unit of said processing unit.

21.   (original) The method in accordance with claim 18, further comprising transmitting memory unit status data, which contain at least information regarding an actual memory status of a memory unit.

22.   (currently amended) A method for serial data transmission between a position measuring system and a processing unit, comprising:

transmitting position data and further data between said position measuring system and said processing unit in serial form as digital data words;

transmitting up-to-date position data between said position measuring system and said processing unit upon transmission of a position request command;

always transmitting further data, whose processing is not time-critical, immediately following said transmitting said up-to-date position data from said position measuring system to said processing unit;

~~The method in accordance with claim 1, further comprising~~ transmitting several different position request commands, which are assigned different processing priorities; and

transmitting said up-to-date position data in accordance with said assigned different processing priorities.

6

23. (original) The method in accordance with claim 3, further comprising transmitting several different position request commands, which are assigned different processing priorities; and

transmitting said up-to-date position data in accordance with said assigned different processing priorities.

24. (original) The method in accordance with claim 22, wherein said different processing priorities comprise:

a first position request command used for position control, which causes said transmission of said up-to-date position data to be at the highest priority; and

a second position request command used for digitizing a workpiece contour, which causes said transmission of said up-to-date position data at a lower priority relative to said first position request command.

25. (original) The method in accordance with claim 22, further comprising interrupting transmission of position data which had been requested by a position request command of a first level of processing priority upon transmission of a position request command of a level of processing priority higher than said first level.

26. (original) The method in accordance with claim 23, wherein said different processing priorities comprise:

a first position request command used for position control, which causes

said transmission of said up-to-date position data to be at the highest priority; and

a second position request command used for digitizing a workpiece contour, which causes said transmission of said up-to-date position data at a lower priority relative to said first position request command.

27.   (original) The method in accordance with claim 23, further comprising interrupting transmission of position data which had been requested by a position request command of a first level of processing priority upon transmission of a position request command of a level of processing priority higher than said first level.

28.   (original) The method in accordance with claim 5, wherein with said transmitting of either of said digital data words or data packets, a data word identification is transmitted, which unequivocally identifies a beginning and type of said respective associated digital data word or data packet.

Claims 29-35 (canceled)

36.   (previously presented) A method for serial data transmission between a position measuring system and a processing unit, comprising:

transmitting up-to-date position data from a position measuring system to a processing unit;

8

transmitting non-time critical data, subsequent to said transmitting up-to-date

position data, from said position measuring system to said processing unit; and

transmitting related non-time-critical data over several blocks, between which up-to

date position data is transmitted.

Claim 37 (canceled)

38.   (previously presented) The method in accordance with claim 36, wherein

parameters of said position measuring system are transmitted via said non-time-critical data.

39.   (previously presented) The method in accordance with claim 36, wherein measured

temperature values are transmitted via said non-time-critical data.

40.   (previously presented) The method in accordance with claim 36, wherein

diagnostic data of said position measuring system are transmitted via said non-time-critical data.

41.   (previously presented) The method in accordance with claim 36, wherein assignment information is transmitted with each of said non-time-critical data.

42.   (previously presented) The method in accordance with claim 36, further comprising requesting, via said processing unit, transmission of said non-time-critical data from said position measuring system.

43.   (previously presented) The method in accordance with claim 36, wherein said non-time-critical data are transmitted in the form of digital data words of a preset word length or as data packets having digital data words.

44.   (previously presented) The method in accordance with claim 36, wherein the data transmitted from the position measuring system to the processing unit are transmitted via a first data channel and the data transmitted from the processing unit to the position measuring system are transmitted via a second data channel.

45.   (previously presented) The method in accordance with claim 36, wherein said transmitting said up-to-date position data takes place between said non-time-critical data.

Claim 46 (canceled)

47.   (previously presented) A system for serial data transmission comprising:

a position measuring system;

a processing unit in communication with said position measuring system; and

means for transmitting up to date position data between said position measuring system and said processing unit and for transmitting non-time critical data subsequent to said transmitting said up to date position data, wherein transmission of related non-time-critical data takes place over several blocks, between which said up to date position data is transmitted.

48.   (previously presented) The system in accordance with claim 47, further comprising:

a first data channel in communication with said position measuring system and said processing unit and transmitting data from said position measuring system to said processing unit; and

a second data channel in communication with said position measuring system and said processing unit and transmitting data from said processing unit to said position measuring system.

Claim 49 (canceled)

50.   (previously presented) The system in accordance with claim 47, wherein a
transmission of parameters of said position measuring system takes place via said non-time-
critical data.

51.   (previously presented) The system in accordance with claim 47, wherein a
transmission of measured temperature values takes place via said non-time-critical data.

52.   (previously presented) The system in accordance with claim 47, wherein a
transmission of diagnostic data of said position measuring system takes place via said non-time-
critical data.

53.   (previously presented) The system in accordance with claim 47, wherein a
transmission of assignment information takes place with said non-time-critical data.

54.   (previously presented) The system in accordance with claim 47, wherein a transmission of said non-time-critical data takes place in the form of digital data words of a preset word length or as data packets having digital data words.

55.   (previously presented) The system in accordance with claim 47, wherein said non-time-critical data is chronologically distributed over said several blocks.